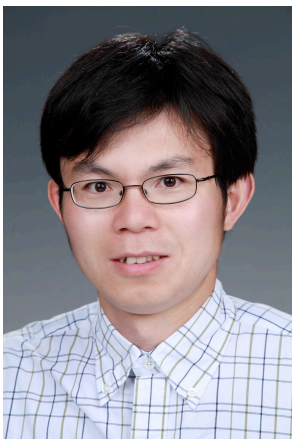
CHEMICAL ENGINEERING
SEMINAR SERIES



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Designing sequence-defined peptoids for bio-inspired synthesis of functional nanomaterials

ABSTRACT: In nature, biomolecules (e.g. proteins) play significant roles in the assembly of hierarchical structures and delivering sequence-specific functions ranging from photosynthesis to molecular separation, selective ion transport and tissue mineralization. Inspired by nature, many sequence-defined molecules have been designed and exploited for the bio-inspired materials synthesis. Among them, peptoids have received particular attention because they combine advantages from both biopolymers and bulk polymers.

In this talk, I will present my group's recent progress in designing peptoids for assembly of biomimetic nanomaterials[1-5] and for controlling the formation of inorganic nanomaterials[6,7]. Specifically, we demonstrated the assembly of amphiphillic peptoids into nanomembranes[1-2], pore-forming networks[3-4], and nanotubes[5]. Our results showed that the peptoid-peptoid and peptoid-substrate interactions play critical roles in the peptoid assembly and can be tuned through the peptoid side-chain chemistry. Supramolecular interactions (e.g. hydrogen bonds π-π stacking or coordination bonds) among peptoid side chains are the main driving forces that lead to the formation and stabilization of highly-ordered superstructures. We also demonstrated the design of peptoids for controlled synthesis of highly branched plasmonic gold nanoparticles, and developed a rule of thumb for designing peptoids that induced the predictable morphological evolution of gold nanomaterials[6]. Because peptoids are biocompatible, highly stable, and offer peptide- and protein-like molecular recognition, peptoid-based approaches offer a unique platform for bio-inspired synthesis of functional nanomaterials.

References: 1. Jin et al., *Nature Comm.* **2016**, 7, 12252; 2. Jiao et al., *Adv. Funct. Mater.* **2016**, 26, 8960; 3. Chen et al., *ACS Nano*, **2016**, 10, 5314; 4. Ma et al., *Nature Mater.* **2017**, 16, 767; 5. Jin et al., *Nature Comm.* **2018**, 9, 270; 6. Yan et al., *Nature Comm.* **2018**, 9, 2327; 7. Merrill et al., *Nanoscale* **2018**, 10, 12445.

RECEPTION 3:30 • LECTURE 4:00 – 5:00
PHYSICS ASTRONOMY BLDG. PAA A 110

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BIOGRAPHY: Chun-Long Chen is currently a senior research scientist at Pacific Northwest National Laboratory (PNN), and a principle investigator at the NW IMPACT (Northwest Institute for Materials, Physics, Chemistry, and Technology). His research group is tackling the challenges of developing sequence-defined peptoids that mimic proteins and peptides that mimic proteins and peptides for assembly of biomimetic functional materials (e.g. artificial membranes) and for controlling inorganic crystal formation, aiming at design and synthesis of bio-inspired functional materials that rival those found in biology.